REMARKS

OBJECTION TO THE DRAWINGS

The drawings stand objected to under 37 CFR 1.83(a) for not showing every feature of the invention as specified in the claims: The gearing or other speed-changing apparatus as recited in claim 231, the boost converter and switching element as recited in claim 245 should be shown. The drawings stand objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "19" has been used to designate both the control mechanism and the converter, and because reference characters "15" and "12" have both been used to designate the generator. Figure 9A is objected to for not carrying a legend such as –Prior Art–

DRAWING OBJECTION - 37 CFR 1.83(a)

New Fig. 1h has been added, showing the placement of the gearing described in claim 231. This has antecedent basis in the specification on page 5, line 4, and on page 15, line 2. Gearing is a well-known feature in the prior art. Fig. 8a shows the boost converter including a switching control element, transistor 43. This is described in detail in the specification, on page 29, line 24, and on page 32, lines 13-26. No new material has been added.

DRAWING OBJECTION - 37 CFR 1.84(p)(4)

Applicant has amended the specification to correct the double use of character reference character "19", and has cancelled the paragraph in which the generator was labeled "12". No new material has been added.

DRAWING OBJECTION

According to MPEP #608.02(g) Fig. 9a should have been labeled Prior Art. A new Fig 9a has been submitted to overcome this objection.

OBJECTION TO THE SPECIFICATION

The specification is objected to under 37 CFR 1.75(d)(1) for not providing proper antecedent basis for the claimed subject matter, and correction of the following is required: adjustment of the torque in a single adjustment step as recited in claim 226, the set of multiple adjustment steps as recited in claim 229, and the secondary step as recited in claim 230. The amendment of October 14 2002 stands objected to under 35 U.S.C. 132 because it seems to add

new matter not supported by the disclosure of the invention, specifically: gearing or other speed changing apparatus as recited in claim 231, a direct current generator as recited in claim 235, the generator comprising an alternating current synchronous permanent magnet machine as recited in claim 236, the boost converter and switching element as recited in claim 245.

SPECIFICATION OBJECTION - 37 CFR 1.75(d)(1)

Claims 226, 229 and 230 have been amended so that they draw on subject matter disclosed in the specification.

SPECIFICATION OBJECTION - 35 U.S.C. 132

The specification describes "gearing or other speed changing apparatus" on page 15, line 2. New Fig. 1h has been provided to graphically show the positioning of the gearing. In addition, applicant has amended claim 231, without prejudice.

The direct current generator of claim 235 is objected as introducing new matter into the disclosure. Applicant has amended the specification to point out that the abbreviation "DC generator" of the specification is synonymous with the longer form in the claims of "direct current generator". DC generators are described at length in the specification and shown in the drawings.

The generator comprising an alternating current synchronous permanent magnet machine as recited in claim 236 stands objected to as introducing new matter into the disclosure. Applicant has amended the specification to point out that the abbreviation "AC" of the specification is synonymous with the longer form in the claims of "alternating current". In addition, this claim has been amended without prejudice. Alternating current synchronous machines are described in the specification beginning on page 16 line 16.

The boost converter and switching element of claim 245 stand objected to as introducing new matter into the disclosure. Page 32, line 13-26 of the specification clearly describes the switching control element as transistor 43, which is a component part of the boost converter. Applicant has amended claim 245 to overcome this objection.

OBJECTION TO THE CLAIMS

The claims stand objected to under 37 CFR 1.126 which requires that claim numbering be preserved and that new claims should be numbered consecutively beginning with the number next following the highest numbered claims previously presented.

Applicant acknowledges with appreciation that the Examiner has renumbered the claims submitted as 225-295, to 223-293.

CLAIM REJECTION

Claims 226-231 and 235-240 and 245 stand rejected under 35 U.S.C. 112, first paragraph, as lacking support in the specification. Claims 226, 229, and 230, referring to the control over the adjustable torque load in a single adjustment step, or with multiple adjustment steps, or using a secondary step, stand rejected as not being described in the specification. Claim 227, referring to the feature of the control mechanism comprising an energy storage unit stands rejected as not being shown in the specification and/or drawings, since the drawings seem to clearly show that the control mechanism 19 and the energy storage unit 21 are two separate systems. Claim 231, referring to gearing or other speed changing apparatus stands rejected as not being supported by the specification or the drawings. Claim 235, referring to the DC generator stands rejected as not being supported by the specification and/or the drawings. Claims 236-240, referring to the AC synchronous permanent magnet machine stand rejected as not being supported by the specification and/or the drawings. Claim 245, referring to the boost converter and switching element stands rejected as not being supported by the specification and/or the drawings. Claims 227, 228, and 231 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite. Claims 223-293 stand rejected under 35 U.S.C 102 (b) as being anticipated by Maekawa (US 5,703,410).

CLAIM REJECTION - 35 U.S.C. 112, First Paragraph

Applicant has made amended the specification on page 24 so that claim 226 contains subject matter described in the specification. Applicant has amended claim 229 to draw on language used in the specification, on page 24, line 21. Applicant has amended claim 230 to draw on language used in the specification, on page 23, line 16. Applicant has amended claim 227 (and claim 228) to describe the control mechanism and the energy storage as two separate,

connected systems. In regard to claim 231, Applicant has supplied an updated diagram, Figure 1h, showing the gearing, to rectify this inadvertent omission and overcome this objection. In addition, applicant has amended claim 231, without prejudice. Applicant has amended the specification to show that the term "DC generator" referred to throughout the specification is synonymous with the term "direct current generator", used in claim 235. Applicant has amended claims 236-240 to draw on the language used in the specification and to more closely align with the diagrams. In addition, applicant has amended the specification to show that the term "AC" referred to in the specification is synonymous with the term "alternating current", used in the claims. Applicant has amended claim 245, to remove any ambiguity. The switching control element is a component of the boost converter, and is described with reference to Figure 8a. On page 32, line 13 of the specification, the switching control element is shown to be equivalent to transistor 43.

CLAIM REJECTION - 35 U.S.C. 112, Second Paragraph

Applicant has amended claims 227, 228, and 231 without prejudice.

REQUEST FOR RECONSIDERATION

Applicant has amended the Drawings so that they include the required details, and corrections, and has made appropriate corrections to the specification.

Applicant has amended many of the claims so that they draw on the language of the specification and of the diagrams.

No new matter is added by these amendments and cancellations and they are fully supported by the specification as filed. Applicant respectfully requests entry of these amendments and cancellations. Further, applicant respectfully requests that the Examiner reconsider the above-captioned patent application in view of the foregoing amendments and the following remarks.

CLAIM REJECTION - 35 USC 102(b) – Maekawa (US 5,703,410)

Maekawa discloses a prime mover output control system comprising: a prime mover 6, a generator 7 powered by the prime mover and comprising an adjustable torque on the prime mover, a control mechanism 8 connected to the generator comprising and input Vd for signaling

a system power output requirement and controlling the adjustable torque of the generator to effect a product of a prime mover velocity and torque to meet the system output requirement, wherein the torque increases with the increase output and decreases with the decreased output, graphical techniques used to determine the load torque (Re Figure 3), energy storage unit (Re column 2, lines 55-57), the control system mechanism not comprising electricity storage as shown in Figure 1 (i.e. converter 8 supplying the recipient through an inverter 9 with somewhat fluctuating power (Re column 3, lines 6-7) electronic components 8 and 30 (Re Figures 1 and 2), direct current generator 7, 8, alternating current generator 7.

The Examiner states that "The limitation of the prime mover comprising a mechanical output comprising a rotational velocity and torque is inherent to Maekawa disclosed engine generator system." and that "The limitation of meeting the different outputs at non-constant or variable velocity is not in the claim."

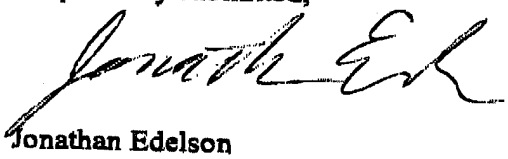
Accordingly, applicant has amended claim 223 to include the clause "wherein said prime mover comprising a characteristic of acceleration and deceleration according to said torque load on said prime mover, towards a synchronous speed with said generator"

Applicant believes that this amendment differentiates applicant's invention from a system anticipated by Maekawa, and respectfully requests that the Rejection under 35 U.S.C. 102(b) be withdrawn.

CONCLUSION

Applicant respectfully submits that this application, as amended, is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that discussing the application the Applicant over the telephone might advance prosecution, Applicant would welcome the opportunity to do so.

Respectfully submitted,



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Version of amended paragraph beginning on page 10, line 23 with markings to show changes made

Fig. 1a shows a schematic overview of the present invention. Prime mover 11 is connected to an electric generator 15 via shaft 13. Generator 15 is connected to control mechanism 19, which may take the form of a power electronic load, as described in Example 3, below, via wiring 17. [Converter]Control mechanism 19 is further electrically connected to an electrical load 22. The control mechanism 19 has an input 65. The generator 15 may be a direct current generator (hereafter, DC), or an alternating current generator (hereafter, AC), as described in the embodiments below, and with reference to the descriptions of various types of generators in the background section above. In the case that the generator 15 is an AC generator, a rectifier 67 may be required between the generator 15 and the control mechanism 19.

Version of amended paragraph beginning on page 11, line 17 with markings to show changes made

Fig. 1d shows a different embodiment of the present invention. An[DC] engine 11 is connected via a shaft to a direct current (DC) generator 15. The excitation of the DC generator is controlled by generator excitation controller 39. The generator is connected with electrical connecting wiring 17 to an energy storage unit 21. The energy storage unit 21 is connected to an electrical load 22, with a controller 29 electrically connected between them load for supplying power to the electrical load 22 at substantially the electrical requirements of the electrical load 22. In related embodiments, the generator is an AC generator with adjustable excitation, in which case a rectifier 67 would need to be added electrically between the generator 15 and the energy storage unit 21.

Version of amended paragraph beginning on page 15, line 1 with markings to show changes made

The heat engine is directly coupled to the generator, via a mechanical means, such as a shaft, or gearing or other speed changing apparatus. Gearing or other speed changing apparatus 82 is shown in Fig. 1h. The generator converts mechanical power into electrical power, and driving an output current through a load. The torque/speed relation of the generator is electronically controlled, either by direct control of generator excitation, or by control of load voltage/current or load frequency characteristics.Through control of the torque/speed characteristics of the generator, control of the system's rotational velocity is effected without the use of a throttle. The heat engine is operated at wide open throttle, with power variation being achieved through changes in rotational velocity.

Version of amended paragraph beginning on page 20, line 15 with markings to show changes made

The generator torque load may be increased by increasing the output current supplied to the load. This may be accomplished by a decrease in the resistance of the load on the generator. More current flows through the lower resistance, and causes the torque load of the generator to be immediately increased. The torque of the system is no longer in equilibrium, the torque of the engine being lower than the torque load of the generator. The speed of the engine decreases, and with it, the engine torque changes according to its torque speed characteristics. When the required engine power output, determined by the product of engine torque and speed, is reached, the load resistance is increased to reduce the generator torque load and restore engine/generator torque equilibrium. Since there is again equilibrium between torque and torque load, the system stops decelerating. At this point the engine is running at a lower speed and with an appropriate torque to maintain that speed and the generator's decreased power requirement is being met. A slightly different method is to decrease the load resistance, and to let the engine/generator system come to equilibrium with the new load resistance. As the engine/generator system slows down, the generator voltage automatically decreases, thus, decreasing the current flow through the resistive load. As the generator torque comes into equilibrium with the engine torque, the system speed will cease[begin] to change.

Version of amended paragraph beginning on page 24, line 12 with markings to show changes made

It is possible to [change]adjust the synchronous speed to achieve the desired change in [one]a single step. However, large changes in synchronous speed could result in non-desired results. The torque/speed curves have maxima, and the trending in both directions towards equilibria only happens if the torque load is below the generator side maximum. Beyond that point, if the generator torque load is greater than the engine torque, the system may slow down towards equilibrium, but should the generator torque load be lower than the engine torque, then the system will accelerate and continue to do so. Therefore, when the system is to be sped up by a large amount, it may be necessary to change the generator torque load in stages, to produce a slower and more gradual change.

Version of amended paragraph beginning on page 26, line 12 with markings to show changes made

The power electronic control 19 synthesizes alternating current at 200 radians per second, again as suitable voltage. The generator 15 is now operating on a new torque/speed curve, and at the current system speed of 100 radians per second will operate as a motor. This is analogous to Fig. 2b. The combination of engine 11 and generator 15 torques act to accelerate the system to approximately 208 radians per second. At this point, equilibrium will obtain with a power output of about 42 kW. During the initial acceleration phase, the system is actually absorbing power as may be seen by the direction of bold arrows 23, which must be supplied by energy storage 21 connected to the power electronic [converter]control 19.

Version of Amended Claim 223 with markings to show changes made

223) A prime mover output control system, comprising

a) a prime mover, comprising a mechanical output comprising a rotational velocity and a torque[,]; and

b) a generator, powered by said prime mover, [comprising]and providing an adjustable torque load on said prime mover[, wherein said torque load having an effect on said rotational velocity of said prime mover,];

wherein said prime mover comprises a characteristic of accleration and deceleration according to said torque load on said prime mover, towards a synchronous speed with said generator; and

c) a control mechanism electrically connected to said generator, comprising an input for signaling a system power output requirement, said control mechanism [comprising]providing control over said adjustable torque load of said generator, to effect a product of prime mover rotational velocity and torque to substantially meet said system power output requirement.

Version of Amended Claim 226 with markings to show changes made

226) The system of claim [225] 224 wherein said control over said adjustable torque load comprising adjustment of said torque load in response to a changed system power output requirement, in a single[adjustment] step.

Version of Amended Claim 227 with markings to show changes made

227) The system of claim 226 wherein said generator supplying power to an [eventual recipient]electrical load, [and wherein said control mechanism comprising an energy storage unit,] and further comprising an energy storage unit connected to said control mechanism, said energy storage unit for supplying said [eventual recipient]electrical load with said system power output requirement, substantially irrespective of prime mover output fluctuations caused by prime mover power output change.

Version of Amended Claim 228 with markings to show changes made

228) The system of claim 226 wherein said generator supplying electricity to an [eventual recipient]electrical load, and [wherein said control mechanism]further not comprising substantial electricity storage[, whereby the eventual recipient receives power of a somewhat fluctuating nature during periods of power output change] between said generator and said electrical load.

Version of Amended Claim 229 with markings to show changes made

229) The system of claim [226] 224 wherein said control over said adjustable torque load comprising adjustment of said torque load in response to a changed system power output requirement, in a [set of multiple adjustment steps] plurality of stages.

Version of Amended Claim 230 with markings to show changes made

230) The system of claim [225] 224 wherein said [generator having dynamically unstable equilibrium with said mechanical output of said prime mover, and wherein said control mechanism further comprising means to accomplish a secondary step of adjusting said torque load to stop said prime mover from further changes in speed, upon the attainment of said system power output requirement]wherein said control over said adjustable torque load comprising adjustment of said torque load in response to a changed system power requirement, to a torque load beyond a torque load required to achieve said changed system power output requirement, and a restoration to said torque load required to achieve said changed system power output requirement, when said changed system power requirement is reached by said prime mover.

Version of Amended Claim 231 with markings to show changes made

231) The system of claim 224 wherein said control mechanism comprising gearing [or other speed changing apparatus] between said prime mover and said generator.

Version of Amended Claim 224 with markings to show changes made

232) The system of claim 224 [wherein said control mechanism] further comprising an energy storage unit connected to said control mechanism.

Version of Amended Claim 236 with markings to show changes made

236) The system of claim 234 wherein said generator comprising an alternating current synchronou[permanent magnet] machine and wherein said power electronic load comprising a control element for adjustment of said controllable current draw, based on a desired relationship between a sampled generator output current and a sampled generator output voltage.

Version of Amended Claim 237 with markings to show changes made

237) The system of claim 234 wherein said generator comprising an alternating current synchronous [permanent magnet] machine and wherein said power electronic load comprising a control element for adjustment of a frequency component of <u>said power</u>, providing said controllable current draw.

Version of Amended Claim 241 with markings to show changes made

241) The system of claim 234 wherein said power electronic load comprising an operating range, comprising positive incremental resistance over part [of]or all of said operating range.

Version of Amended Claim 243 with markings to show changes made

243) The system of claim 242 wherein said threshold voltage adjuster further connected to said input for signaling a system power output requirement, and further comprising graphical or mathematical techniques for determining said threshold voltage in accordance with said [required]system power output requirement.

Version *of Amended* Claim 244 with markings to show changes made

244) The system of claim 243 wherein said threshold voltage adjuster comprising means to increase said threshold voltage in response to an input signal describing a[required] power output requirement increase, and means to decrease said threshold voltage in response to an input signal describing a[required] power output requirement decrease.

Version of Amended Claim 245 with markings to show changes made

245) The system of claim 236 wherein said power electronic load compris[ing]es a boost converter [, said boost converter comprising an electrical input from said generator and a switching element for controlling said current draw by controlling the current versus voltage relationship of said electrical input from said generator].

Version of Amended Claim 252 with markings to show changes made

252) The system of claim 224 wherein said [mechanical load comprising an electrical generator, supplying power to an electrical load, said]generator comprising adjustable excitation, and wherein said generator being configured to have a torque load directly related to its excitation, and wherein said control mechanism comprising control over said adjustable excitation to control said torque load.

Version of Amended Claim 273 with markings to show changes made

273) The system of claim 223 wherein said [mechanical load comprising:

a) an electrical load, and

b) a generator for generating electricity for said electrical load, and comprising] generator having an excitation current [having a] of adjustable frequency, and wherein said control mechanism comprising

[c) energy storage, connected to an output of said generator and an input of said electrical load, and

d)] a generator excitation control for controlling said excitation current of said generator to effect control over said torque load on said prime mover; and wherein said system further comprising:

a) energy storage, connected to the output of said generator, and

b) an electrical load connected to said energy storage.

Version of Amended Claim 279 with markings to show changes made

279) The system of claim [278] 273 wherein said generator excitation control further comprising

a) an input for receiving a signal to start said system,

b) means to increase inverter frequency in response to said signal, and

c) a power electronic load connected between said generator and said energy storage, for causing said energy storage to supply operating power to said generator; whereby said prime mover may be started.

Version of Amended Claim 280 with markings to show changes made

280) The system of claim 223 wherein said generator for generating alternating current and comprising electrical terminals, and wherein said control mechanism comprising[:

a)] a power electronic load, connected to said electrical terminals of said generator, said power electronic load comprising rectifier components, for converting alternating current to direct current, and wherein said power electronic load comprising control over the frequency of said alternating current, to effect control over said torque load of said generator on said prime mover[,];

said system further comprising [b)] energy storage, connected to said power electronic load, and[

c)] an electrical load, connected to said energy storage.

Version of Amended Claim 290 with markings to show changes made

290) The system of claim 223 further comprising energy storage and wherein said mechanical load comprising a generator, for supplying electrical power to an electrical load, [,] and wherein said control mechanism comprising an electrical input from said generator and being configured to control the resistance of said input to effect control over said torque load; [;] and wherein said control mechanism comprising an electrical output to said energy storage.

Version of Amended Claim 291 with markings to show changes made

291) The system of claim 290 further comprising a controller[load], electrically connected between said energy storage unit, and said electrical load[and] having control over the conversion of electrical power from said energy storage to said electrical load to substantially provide the electrical requirements of said electrical load.